Glass Width

Visual Inspection System

Non-Contact Continuous Gross/Net Width Control Measurement Using Dual GigE Imaging

This white paper presents a high-accuracy visual inspection system developed by JM Canty Inc. for real-time measurement of gross and total glass width in continuous production environments. The system integrates dual high-resolution GigE cameras, advanced perspective-based calibration, and optimized wavelength imaging to deliver reliable edge and knurl detection without external lighting. Designed for harsh thermal environments and validated through years of global glass-plant testing, the Canty solution provides significant operational benefits, including reduced scrap, lower energy consumption, and improved furnace longevity.

CANTY
PROCESS TECHNOLOGY

Contents

Overview

Accurate glass width measurement is essential for controlling energy usage, minimizing scrap, and ensuring consistent product quality in flat glass manufacturing. Traditional measurement systems often rely on top-down imaging, external lighting, or compressed IP camera feeds, all of which introduce error, reduce image fidelity, and shorten equipment lifespan.

Canty's dual-camera visual inspection system addresses these limitations through:

- Optimized camera placement outside the lehr
- High-temperature-rated GigE imaging hardware
- Wavelength-specific sensors that eliminate the need for lighting
- A perspective-based calibration algorithm for precise edge tracking
- A Vector Control Module (VCM) for plug-and-play processing and industrial connectivity

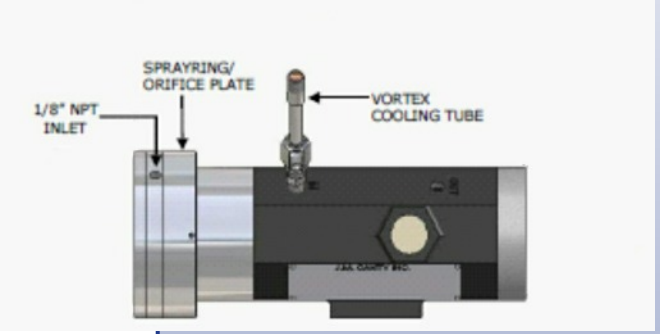
The result is a robust, repeatable, and low-maintenance solution for continuous glass width measurement.

Hardware Architecture

GigE Cameras

Two high-resolution GigE cameras form the core of the system. Each camera is enclosed in an IP67-rated, temperature-resistant, fully jacketed metal housing. Cooling options include:

- Water cooling
- Air cooling



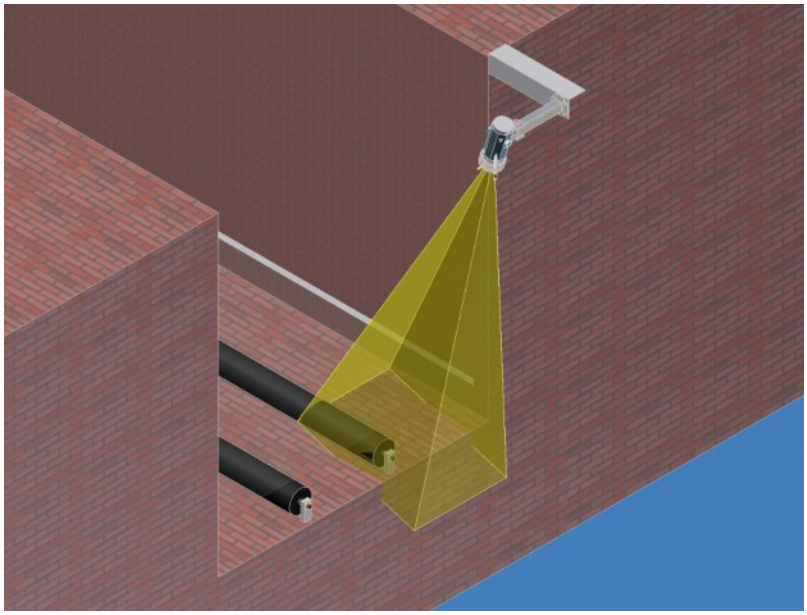
Key hardware features:

- PoE (Power over Ethernet) for simplified wiring
- Adjustable mounting brackets for precise alignment
- 50+ frames per second imaging for real-time tracking
- High-temperature-rated sensors designed for lehr-adjacent environments

Camera Placement

Cameras are positioned across from one another at 45°–65° angles, aimed inward toward the glass edge. This geometry enables:

- Optimal visibility of knurl and edge features
- Reduced thermal exposure compared to top-down systems
- Stable imaging unaffected by reflection-based artifacts



- **Vector Control Module (VCM)**

The VCM serves as the embedded image-processing platform. It provides:

- Direct PoE camera connections
- Factory-configured CantyVision™ software
- Industrial communication outputs including analog, Modbus, and OPC
- Plug-and-play deployment with minimal setup

Software & Algorithms

Lighting-Free Imaging

Canty's camera sensors operate in a specialized wavelength range that enhances contrast at the glass edge and knurl while suppressing irrelevant image regions. This eliminates the need for external lighting, reducing maintenance and improving reliability.

Perspective-Based Calibration

A dot-grid calibration target is used to perform a one-step calibration:

1. A single snapshot of the grid is captured.
2. Canty's algorithm computes a perspective correction.
3. The system accurately tracks edge movement as the glass shifts closer or farther from the cameras.

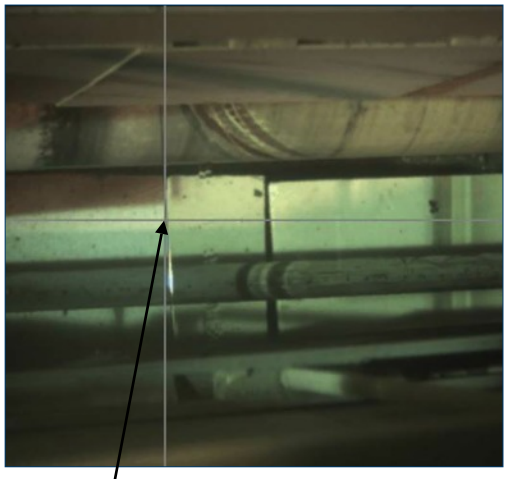
This calibration method ensures:

- High measurement accuracy
- Stability across varying production conditions
- Reliable gross and total width calculations

Edge & Knurl Detection

CantyVision™ software incorporates algorithms refined through years of in-process testing. Advantages include:

- High-fidelity edge detection from uncompressed GigE images
- Reliable knurl tracking even under challenging thermal conditions
- Superior performance compared to IP cameras, which degrade image quality through compression



Outer Glass Edge Tracked
by CantyVision™
(note cross-hair position)

Inner Knurl Edge Tracked
by CantyVision™
(note cross-hair position)

Connectivity & Integration

The system integrates seamlessly into plant control architectures through:

- Analog outputs for direct control loops
- Modbus for PLC communication
- OPC for SCADA and higher-level systems

The VCM's plug-and-play configuration reduces commissioning time and ensures consistent performance across installations.

Operational Benefits & Cost Savings

Reduced Scrap and Energy Consumption

Although scrap glass is recyclable, the energy required to remelt it is not recovered. By improving width control, Canty systems reduce unnecessary scrap and lower furnace load.

Example:

- Operating width: 100 in (2500 mm)
- Scrap: reduced from 10 in total to 5 in total
- Energy savings: 5% reduction per day
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If furnace energy costs total $2M per quarter, this reduction yields:

- $100,000 annual energy savings
- Additional savings from reduced furnace wear
- Increased throughput due to tighter width control

Combined with Canty's level-control thickness system, payback occurs within days of installation.

Conclusion

Canty's dual-camera glass width inspection system delivers a highly accurate, reliable, and maintenance-friendly solution for continuous glass production. Purpose-built hardware, wavelength-optimized imaging, and advanced calibration algorithms ensure precise measurement of glass edges and knurls without external lighting or top-down thermal exposure. The Vector Control Module provides simple installation, robust connectivity, and consistent performance.

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